

INCH-POUND

MIL-PRF-19500/657A
22 February 2000
SUPERSEDING
MIL-PRF-19500/657
23 December 1997

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, FIELD EFFECT, RADIATION HARDENED, TRANSISTOR DIE,
N and P-CHANNEL, SILICON
VARIOUS TYPES JANHC, AND JANKC

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for N and P-channel, enhancement-mode, MOSFET, radiation hardened, power transistor die. Two levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figures 1 through 5 herein.

1.3 Maximum ratings. See the applicable associated performance specification from table I herein.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC/VAC, Post Office Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

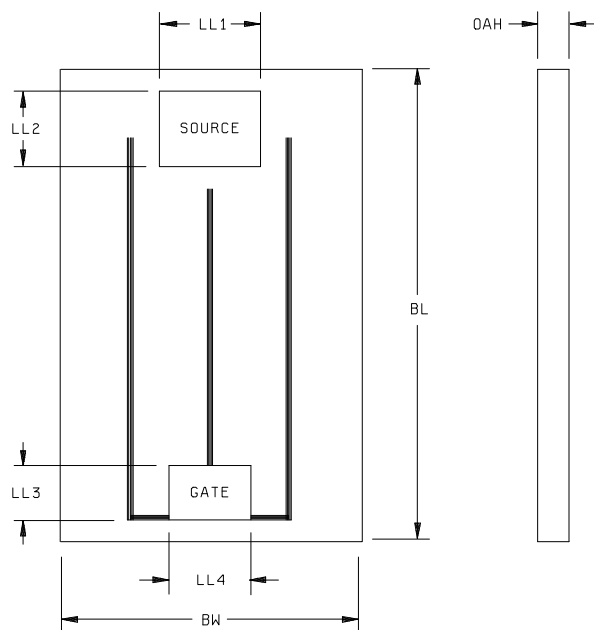
DEPARTMENT OF DEFENSE

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Defense Automated Printing Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2N7261, 2N7262, 2N7380, 2N7381, 2N7382, 2N7383, 2N7389, 2N7390



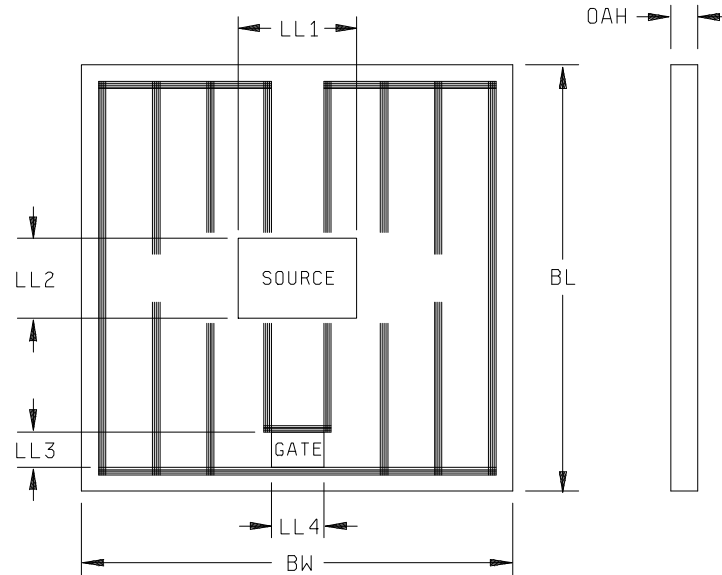
Ltr	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BL	0.173	0.189	4.39	4.81
BW	0.108	0.124	2.74	3.15
OAH	0.0145	0.0175	0.368	0.445
LL1	0.042	0.044	1.06	1.12
LL2	0.029	0.031	0.73	0.79
LL3	0.0195	0.0205	0.495	0.521
LL4	0.026	0.028	0.66	0.72

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 1. JANKC A-version die dimensions.

2N7268, 2N7269, 2N7394, 2N7422, 2N7423



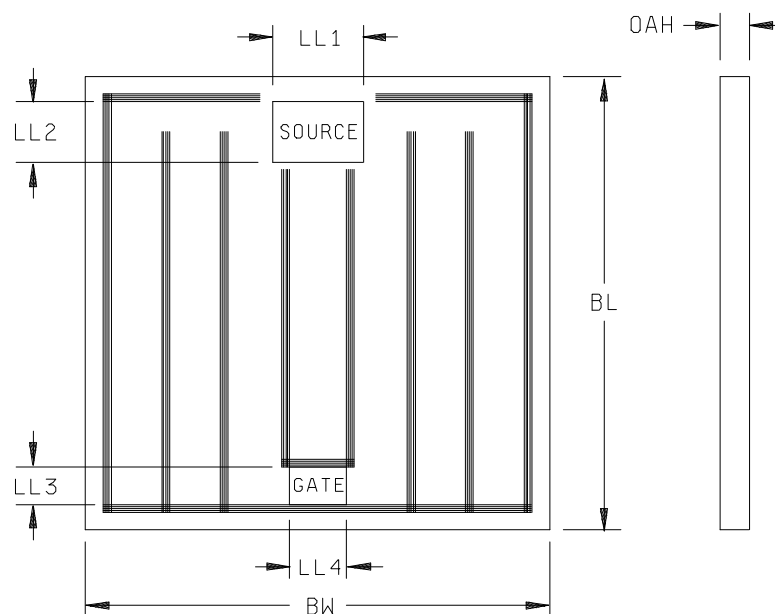
Ltr	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BL	0.249	0.265	6.32	6.74
BW	0.249	0.265	6.32	6.74
OAH	0.0145	0.0175	0.368	0.445
LL1	0.069	0.071	1.75	1.81
LL2	0.047	0.049	1.19	1.25
LL3	0.0205	0.0215	0.520	0.550
LL4	0.03	0.032	0.76	0.82

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 2. JANHC and JANKC A-version die dimensions.

2N7270



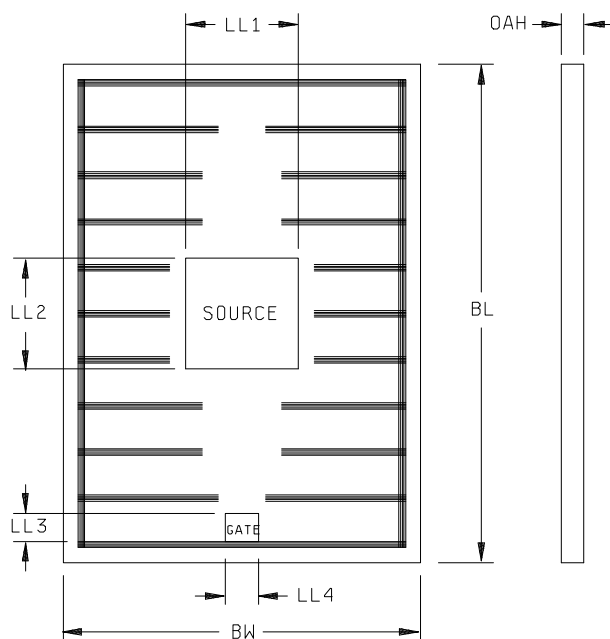
Ltr	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BL	0.249	0.265	6.32	6.74
BW	0.249	0.265	6.32	6.74
OAH	0.0155	0.0185	0.393	0.470
LL1	0.048	0.050	1.21	1.27
LL2	0.033	0.035	0.83	0.89
LL3	0.0205	0.0215	0.520	0.550
LL4	0.03	0.032	0.76	0.82

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 3. JANHC and JANKC A-version die dimensions.

2N7424, 2N7425, 2N7426, 2N7431, 2N7432, 2N7433, 2N7434, 2N7444



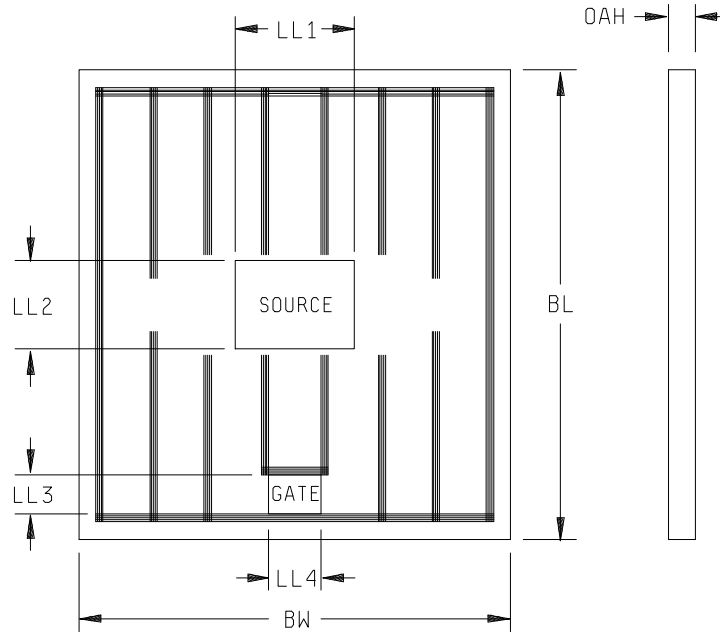
Ltr	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BL	0.352	0.368	8.94	9.35
BW	0.249	0.265	6.32	6.74
OAH	0.0145	0.0175	0.368	0.445
LL1	0.079	0.081	2.00	2.06
LL2	0.079	0.081	2.00	2.06
LL3	0.0195	0.0205	0.495	0.521
LL4	0.0231	0.0241	0.586	0.613

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. JANHC and JANKC A-version die dimensions.

2N7391, 2N7392



Ltr	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BL	0.352	0.368	8.94	9.35
BW	0.249	0.265	6.32	6.74
OAH	0.0145	0.0175	0.368	0.445
LL1	0.064	0.066	1.62	1.68
LL2	0.050	0.052	1.27	1.32
LL3	0.0205	0.0215	0.52	0.55
LL4	0.030	0.032	0.76	0.82

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 5. JANHC and JANKC A-version die dimensions.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable Qualified Manufacturer's List (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 through 5 herein.

3.4.1 Lead finish, material, and thickness. The metallization shall be aluminum for the top and chrome-nickel-silver for the bottom. The nominal thickness of top metallization shall be 3 μm (4 μm nominal for all 60V die). The nominal thickness of back metallization shall be 0.55 μm .

3.5 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection.

3.5.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. However, the following handling practices are recommended (see 3.5).

- a. Devices should be handled on benches with conductive handling devices.
- b. Ground test equipment, tools, and personnel handling devices.
- c. Do not handle devices by the leads.
- d. Store devices in conductive foam or carriers.
- e. Avoid use of plastic, rubber, or silk in MOS areas.
- f. Maintain relative humidity above 50 percent if practical.
- g. Care should be exercised during test and troubleshooting to apply not more than maximum rated voltage to any lead.
- h. Gate must be terminated to source, $R \leq 100 \text{ k}$, whenever bias voltage is to be applied drain to source.

MIL-PRF-19500/657A

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in the applicable associated performance specification listed in table I herein.

TABLE I. Applicable associated performance specifications.

Type	Associated performance specification	Reference data			Figure
		Voltage (V dc)	Channel	Size	
2N7261 or 2N7261U	MIL-PRF-19500/601	100	N	3	1
2N7262 or 2N7262U	MIL-PRF-19500/601	200	N	3	1
2N7394 or 2N7394U	MIL-PRF-19500/603	60	N	5	2
2N7268 or 2N7268U	MIL-PRF-19500/603	100	N	5	2
2N7269 or 2N7269U	MIL-PRF-19500/603	200	N	5	2
2N7270 or 2N7270U	MIL-PRF-19500/603	500	N	5	3
2N7380	MIL-PRF-19500/614	100	N	3	1
2N7381	MIL-PRF-19500/614	200	N	3	1
2N7382	MIL-PRF-19500/615	100	P	3	1
2N7383	MIL-PRF-19500/615	200	P	3	1
2N7389 or 2N7389U	MIL-PRF-19500/630	100	P	3	1
2N7390 or 2N7390U	MIL-PRF-19500/630	200	P	3	1
2N7424U	MIL-PRF-19500/655	60	P	6	4
2N7425U	MIL-PRF-19500/655	100	P	6	4
2N7426U	MIL-PRF-19500/655	200	P	6	4
2N7424	MIL-PRF-19500/660	60	P	6	4
2N7425	MIL-PRF-19500/660	100	P	6	4
2N7426	MIL-PRF-19500/660	200	P	6	4
2N7444	MIL-PRF-19500/661	200	N	6	4
2N7434	MIL-PRF-19500/661	250	N	6	4
2N7391	MIL-PRF-19500/661	400	N	6	5
2N7392	MIL-PRF-19500/661	500	N	6	5
2N7422 or 2N7422U	MIL-PRF-19500/662	100	P	5	2
2N7423 or 2N7423U	MIL-PRF-19500/662	200	P	5	2
2N7431	MIL-PRF-19500/663	60	N	6	4
2N7432	MIL-PRF-19500/663	100	N	6	4
2N7433	MIL-PRF-19500/663	200	N	6	4
2N7431U	MIL-PRF-19500/664	60	N	6	4
2N7432U	MIL-PRF-19500/664	100	N	6	4
2N7433U	MIL-PRF-19500/664	200	N	6	4

3.7 Marking. Marking shall be in accordance with MIL-PRF-19500. At the option of the manufacturer, marking may be omitted from the body, but shall be retained on the initial container.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- Qualification inspection (element evaluation) (see 4.2).
- Conformance inspection (see 4.3)

MIL-PRF-19500/657A

4.2 Qualification inspection (element evaluation). Qualification inspection (element evaluation) shall be in accordance with MIL-PRF-19500, appendix G, and the applicable associated performance specification from table I herein.

4.3 Conformance inspection (group D). Conformance inspection (group D) shall be conducted in accordance with table VIII of MIL-PRF-19500 and the applicable associated performance specification from table I herein.

4.4 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.4.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- c. Packaging requirements (see 5.1).
- d. Specify the JANHC or JANKC letter version (see figures 1, 2, 3, 4 and 5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List, QML-19500, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC-VQE, Post Office Box 3990, Columbus, OH 43216-5000.

6.4 Cross reference list. The following chart shows the generic P/N and its' associated military P/N (without the JAN or RHA prefix). Multiple military part number indicates that the same die type is used on more than one performance specification sheet.

Military P/N	Generic P/N
2N7261, 2N7261U and 2N7380	IRHCX130 (1)
2N7262, 2N7262U and 2N7381	IRHCX230 (1)
2N7382, 2N7389 and 2N7389U	IRHC9Y130 (2)
2N7383, 2N7390 and 2N7390U	IRHC9Y230 (2)
2N7394 and 2N7394U	IRHCX054 (1)
2N7268 and 2N7268U	IRHCX150 (1)
2N7269 and 2N7269U	IRHCX250 (1)
2N7270 and 2N7270U	IRHCX450 (1)
2N7424 and 2N7424U	IRHC9Y064 (2)
2N7425 and 2N7425U	IRHC9Y160 (2)
2N7426 and 2N7426U	IRHC9Y260 (2)
2N7444	IRHC7260SE
2N7434	IRHC7264SE
2N7391	IRHC7360SE
2N7392	IRHC7460 SE
2N7422 and 2N7422U	IRHC9Y150 (2)
2N7423 and 2N7423U	IRHC9Y250 (2)
2N7431 and 2N7431U	IRHCX064 (1)
2N7432 and 2N7432U	IRHCX160 (1)
2N7433 and 2N7433U	IRHCX260 (1)

(1) Replace X with number indicating qualified Rad Hardness as follows:

- 7 = 100K Rad (Si) equivalent to RHA designator R
- 3 = 300K Rad (Si) equivalent to RHA designator F
- 4 = 600K Rad (Si) equivalent to RHA designator G
- 8 = 1000K Rad (Si) equivalent to RHA designator H

(2) Replace Y with number indicating qualified Rad Hardness as follows:

- Blank = 100K Rad (Si) equivalent to RHA designator R
- 3 = 300K Rad (Si) equivalent to RHA designator F

6.5 Suppliers of JANHC and JANKC die. The qualified die suppliers with the applicable letter version (example, JANHCA2N7261) will be identified on the QML.

JANC ordering information	
Type	Manufacturer
	59993
2N7261, 2N7261U	JANHCAR2N7261, JANKCAR2N7261 JANHCAF2N7261, JANKCAF2N7261 JANHCA2N7261, JANKCA2N7261 JANHCAH2N7261, JANKCAH2N7261
2N7262, 2N7262U	JANHCAR2N7262, JANKCAR2N7262 JANHCAF2N7262, JANKCAF2N7262 JANHCA2N7262, JANKCA2N7262 JANHCAH2N7262, JANKCAH2N7262
2N7394, 2N7394U	JANHCAR2N7394, JANKCAR2N7394 JANHCAF2N7394, JANKCAF2N7394 JANHCA2N7394, JANKCA2N7394 JANHCAH2N7394, JANKCAH2N7394
2N7268, 2N7268U	JANHCAR2N7268, JANKCAR2N7268 JANHCAF2N7268, JANKCAF2N7268 JANHCA2N7268, JANKCA2N7268 JANHCAH2N7268, JANKCAH2N7268
2N7269, 2N7269U	JANHCAR2N7269, JANKCAR2N7269 JANHCAF2N7269, JANKCAF2N7269 JANHCA2N7269, JANKCA2N7269 JANHCAH2N7269, JANKCAH2N7269
2N7270, 2N7270U	JANHCAR2N7270, JANKCAR2N7270 JANHCAF2N7270, JANKCAF2N7270 JANHCA2N7270, JANKCA2N7270 JANHCAH2N7270, JANKCAH2N7270
2N7380	JANHCAR2N7380, JANKCAR2N7380 JANHCAF2N7380, JANKCAF2N7380 JANHCA2N7380, JANKCA2N7380 JANHCAH2N7380, JANKCAH2N7380
2N7381	JANHCAR2N7381, JANKCAR2N7381 JANHCAF2N7381, JANKCAF2N7381 JANHCA2N7381, JANKCA2N7381 JANHCAH2N7381, JANKCAH2N7381
2N7382	JANHCAR2N7382, JANKCAR2N7382 JANHCAF2N7382, JANKCAF2N7382
2N7383	JANHCAR2N7383, JANKCAR2N7383 JANHCAF2N7383, JANKCAF2N7383
2N7389, 2N7389U	JANHCAR2N7389, JANKCAR2N7389 JANHCAF2N7389, JANKCAF2N7389
2N7390, 2N7390U	JANHCAR2N7390, JANKCAR2N7390 JANHCAF2N7390, JANKCAF2N7390
2N7424, 2N7424U	JANHCAR2N7424, JANKCAR2N7424 JANHCAF2N7424, JANKCAF2N7424
2N7425, 2N7425U	JANHCAR2N7425, JANKCAR2N7425 JANHCAF2N7425, JANKCAF2N7425

MIL-PRF-19500/657A

JANC ordering information - Continued.	
Type	Manufacturer
	59993
2N7426, 2N7426U	JANHCAR2N7426, JANKCAR2N7426 JANHCAF2N7426, JANKCAF2N7426
2N7444	JANHCAR2N7444, JANKCAR2N7444
2N7434	JANHCAR2N7434, JANKCAR2N7434
2N7391	JANHCAR2N7391, JANKCAR2N7391
2N7392	JANHCAR2N7392, JANKCAR2N7392
2N7422, 2N7422U	JANHCAR2N7422, JANKCAR2N7422 JANHCAF2N7422, JANKCAF2N7422
2N7423, 2N7423U	JANHCAR2N7423, JANKCAR2N7423 JANHCAF2N7423, JANKCAF2N7423
2N7431, 2N7431U	JANHCAR2N7431, JANKCAR2N7431 JANHCAF2N7431, JANKCAF2N7431 JANHCAG2N7431, JANKCAG2N7431 JANHCAH2N7431, JANKCAH2N7431
2N7432, 2N7432U	JANHCAR2N7432, JANKCAR2N7432 JANHCAF2N7432, JANKCAF2N7432 JANHCAG2N7432, JANKCAG2N7432 JANHCAH2N7432, JANKCAH2N7432
2N7433, 2N7433U	JANHCAR2N7433, JANKCAR2N7433 JANHCAF2N7433, JANKCAF2N7433 JANHCAG2N7433, JANKCAG2N7433 JANHCAH2N7433, JANKCAH2N7433

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
NASA - NA
DLA - CC

Preparing activity:
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(Project 5961-2237)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-19500/657A

2. DOCUMENT DATE (YYMMDD)
22 February 2000

DOCUMENT TITLE SEMICONDUCTOR DEVICE, FIELD EFFECT, RADIATION HARDENED, TRANSISTOR DIE, N and P-CHANNEL, SILICON VARIOUS TYPES JANHC, AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)
Commercial
DSN
FAX
EMAIL

7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. Point of contact: Alan Barone

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c. ADDRESS: Defense Supply Center
Columbus, ATTN: DSCC-VAC, 3990 East
Broad Street, Columbus, OH 43216-5000

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